Before the Federal Communications Commission
Washington, DC 20554

In the Matter of:	)	
	)	
Revision of the Commission's Rules to ensure Service Support Mechanism	)	CC Docket No. 94-102
	)	

PETITION FOR DECLARATORY RULING AND/OR CLARIFICATION SUBMITTED BY THE WIRELESS 911 BOARD OF NORTH CAROLINA

I. Introduction

The North Carolina Wireless 911 Board (Wireless Board), pursuant to Sections 1.2 and 1.41 of the Commission's Rules, 47 C.F.R. §§1.2, 1.41, hereby petitions the Commission for clarification and/or a declaratory ruling that the uncertainty (or certainty) factor[1] is part of the Automatic Location Information (ALI) when this information comprises part of the data sent by wireless carriers, and must be delivered by wireline carriers to the Public Safety Answering Points (PSAPs).

Reporting the uncertainty factor to PSAPs is not part of testing or compliance, but it is clearly relevant to achieving the best practices currently recognized by industry standards and it is logically related to prior FCC Orders and OET-71. The primary objective of E911 is to provide location information on parity with wireline systems. Hence, accuracy and reliability of E911 location information must be maximized to the PSAPs.

II. Background

[1] Both are included hereinafter as the "uncertainty factor."

The Commission has expressed a desire to permit development of wireless 911 services in a technology-neutral manner, while establishing rules to guide development toward systems that provide parity with wireline services. Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket 94-102, Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 18676, at 56 (1996) (*E911 First Report and Order*). The Commission intended the FNPRM to determine whether requirements could be developed for more precise location information and delivery of such information to PSAPs. *Id. at 18743-18746*. The Root Mean Square (RMS) method adopted in the *E911 First Report and Order* provided a distance measurement and probability standard for accuracy then considered reasonable. *Id at 18711-12*. The Commission revised its Rules to replace the RMS methodology with specific accuracy requirements for network solutions and handset solutions. Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, cc Docket 94-102, E911 Reconsideration Order, 14 FCC Rcd 17388 (*Third Report and Order*). The *Third Report and Order* recognized both components by establishing accuracy standards for network and handset based calls, respectively, of 100 meters for 67% of calls and 300 meters for 95% of calls; and 50 meters for 67% of calls and 150 meters for 95% of calls. *Id at 17394*. The Commission explained that 125 meters RMS would result in an approximate 67 to 75 percent probability that a caller's location would be within a 125 meter radius of the caller's actual location.

These standards apply directly to wireless carrier testing and compliance; and have consequences affecting operational efficiencies of the PSAPs. Operational efficiencies of PSAPs and public benefits of ALI include life-saving advantages, routing of calls and removal of redundant calls. *Id at 17388*. The Commission also observed that the value of ALI is limited by

the extent to which PSAPs have and utilize equipment or systems capable of receiving and using ALI data. *Id at 17407*. North Carolina is fortunate to have many PSAPs now capable of receiving and using ALI data.[2] One result of this benefit and the actual use of ALI data is that some North Carolina PSAPs report that some wireline providers do not pass the uncertainty and confidence factors with the ALI.

Many wireless carriers use position determining equipment (PDE) that calculates and sends data comprising an uncertainty factor and a confidence factor to the mobile positioning center (MPC). Typical PDE systems set the confidence factor at 67% or 95% indicating whether the location meets the standards required by 47 CFR 20.18(h). The PSAP call taker will recognize the uncertainty factor as a calculated number that estimates the potential range, or distance error, for a given call based on the quality and quantity of data that is actually collected for that call. A confidence level of 95% is generally interpreted by PSAPs to mean that there is a 95% confidence that the latitude/longitude location is within a circle with a radius equal to the uncertainty factor. For example, if the display indicates a location on a Phase II call with an uncertainty of 30, PSAPs apply this information by assuming that there is a 95% chance that the true caller location is within a circle having a 30 meter radius.

The Wireless Board understands that the actual mathematical calculations used to generate the uncertainty factor may not always result in circles centered upon the calculated caller location. For this reason alone, capture and reporting of the uncertainty factor is not appropriate for measuring carrier compliance. PSAP call taker assumptions of a circle retain

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[2] As of Sept. 1, 2004, the Wireless Board reported 61% of counties having Phase II deployed. Four wireless carriers have deployed Phase II in more than 90% of their operating counties; four others have deployed Phase II in more than 70% of their operating counties.

significant value. A ruling from the Commission is necessary because some, but not all, wireline carriers are passing the uncertainty factor.

I. Argument

A. The uncertainty factor and confidence factor, when calculated and transmitted by or for a wireless carrier comprise part of the ALI data for 47 C.F.R. §20.18(e), (h).

Accuracy may be understood to mean freedom from error or conformity to a standard. Reliability originally referred to the RMS probability standard that location information is accurate. *E911 First Report and Order, at 18711*. The Wireless Board suggests that reliability refers to how dependable the location information is, or the degree of certainty associated with the location information, and that reliability is analogous to a confidence interval.[3] The Wireless Board believes, and therefore argues, that the uncertainty factor is part of the location information in the context of prior Commission rulings and delivery of ALI to PSAPs.

A confidence interval may be established for wireless 911 calls when call data is received from multiple sources or when the call taker "re-bids" for updated location information. Many wireless providers presently provide such data and identify an uncertainty factor with the call data. The uncertainty factor is expressed as a distance measurement or percentage and allows the PSAP call taker to know the degree of accuracy associated with the call data. If, for example, the uncertainty factor is 2000 meters, the call taker knows that the location is not as certain as a call having a factor of 20 meters. Such distinctions may be important when locating a caller and dispatching services when boundaries such as rivers, road construction, or other impediments may affect the response time of the dispatched services.

B. Providing all accuracy and reliability location information to PSAPs is consistent with the Commission's prior rulings and wireless 911 principles.

A fundamental principle of wireless 911 service is parity with wireline 911 service. Wireline 911 service offers the advantage of Master Street Address Guides where location of the caller may be easily determined. ALI requirements attempt to achieve parity between wireline and its MSAG, and wireless and the accuracy and reliability requirements of 47 C.F.R. §20.18.

In the *E911 First Report and Order*, the Commission stated that it intended to determine whether requirements could be developed requiring carriers to deliver more precise location information, and the extent to which such information could be monitored and updated by the carrier to ensure its accuracy. *E911 First Report and Order at 18742*. Comments on RMS and other standards varied, reflecting numerous approaches to determining standards and reporting compliance with those standards. The uncertainty factor is neither a required standard nor a measure of compliance with accuracy or reliability, but rather a calculated result of a wireless carrier's location determination. This information is more advantageous to PSAPs and callers than RMS information due to its greater accuracy. Hence, the uncertainty and confidence factors represent an expression of the probability concept inherent in RMS, albeit in greater detail. This is consistent with the Commission's expectations and admonitions to the E911 community to achieve the goals of E911.

C. Industry Standards support the Wireless Board

Prior to the *Third Report and Order*, and since, interested parties have continued discussions regarding technical standards; solutions and methods related to delivery of ALI and

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[3] "A group of continuous or discrete adjacent values used to estimate s statistical parameter, as a mean or variance, and tends to include the true value of the parameter." Webster's 10th

the accuracy and reliability requirements of 47 C.F.R. §20.18(e), (h). This is entirely consistent with the Commission's reliance upon the E911 community to develop methods of determining compliance with the standards. *Id at 17426*. Relevant references reviewed are: OET Bulletin No. 71, CDMA Development Group Test Plan Document for Location Determination Technologies Evaluation (2000), Wireless Phase I & II Features & Functions Operational Information Document (NENA Document 57-501), Enhanced Wireless 9-1-1 Phase 2 J-STD-036A, and Emergency Services Interconnection Forum (ESIF Issue ESIF-011, and ESIF-022).

OET 71 addresses calculation and reporting of a confidence level, and states that a set of accuracy measurements may be compliant if the confidence intervals contain error thresholds established by the FCC. The error thresholds are the accuracy standards of the *Third Report and Order* and 47 CFR 20.18(h). Calculation of the confidence factor is addressed in OET 71 as a method of demonstrating compliance with 47 C.F.R. 20.18(h). OET 71 also provides more than one geographic basis for wireless carriers to measure their location accuracy. Industry standards recognize value to the PSAPs in delivery of confidence level and confidence interval information. The confidence interval information is equivalent to the uncertainty factor.

NENA includes the uncertainty factor and confidence factor in its Phase II data elements. NENA document 54-501, section 3.2.3. These factors are additional data options in J-STD-036. NENA document 54-501 also notes that the confidence factor should not be used alone, and only in conjunction with the uncertainty factor. NENA illustrates the value of these factors by noting that the default location of a cell sector may have an uncertainty greater than 3000 meters while a GPS location may have an uncertainty of only 20 meters. PSAPs cannot distinguish between the

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Collegiate Dictionary

reported locations in this example without the aid of the uncertainty factor: the difference in potential search areas is obvious.

Uncertainty is typically expressed in meters while confidence is expressed as a percentage. Uncertainty is generally interpreted as a radius. ESIF explains that confidence intervals and confidence levels are interrelated elements in the estimation of a caller's location. ESIF-022, July 14, 2004, Annex A. ESIF has cautioned PSAPs regarding use of this information, but recommended that when "confidence and [un] certainty can be determined by the location technology then the location technology should fix confidence and vary uncertainty to illustrate the probable location of the caller." ESIF Recommendation for Use of Confidence and Uncertainty for Wireless Phase 2 (July 17, 2003) The Wireless Board believes ESIF is continuing to examine issues related to location accuracy and reliability.

CDMA Development Group has provided details for test methods that illustrate the value of measurements analogous to the confidence level and uncertainty factor. CDG Test Plan Document for Location Determination Technologies Evaluation. The test plan proposed measures the circular error probability (CERP), and explains that a "67% within 50 meters CERP" means that 67% of the location attempts are located within a circle of 50 meters radius centered at ground truth. The *Test Plan* contrasts CERP with the uncertainty factor, which is defined as an expression of the radius of uncertainty for a single location determination based on the 67% and 95% CERP estimates.

D. The Wireless Board's suggested conclusion is consistent with the Commission policies of technical-neutrality and public benefit.

The Commission has emphasized that its rules are intended to be technology-neutral, and encourage efficient and effective location technologies, while noting that location information

may be the most important piece of wireless 911 information. Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket 94-102, Memorandum Opinion and Order, 12 FCC Rcd 22665 at 22668 (1997). By adopting performance criteria, the Commission sought to guide development of ALI to promote public safety and welfare. *Id at 22724-5*. Most wireless carriers operating in the Wireless Board's jurisdiction supply the uncertainty factor, and the Board believes this is true in most other jurisdictions. Further, the Wireless Board believes that most wireline carriers are passing the uncertainty factor to PSAPs. Given this operational functionality, the Wireless Board argues that the Commission's directive to all parties to work together and the recognition of an evolving paradigm support a ruling that the uncertainty factor, or any analogous ALI information, is a part of the ALI and must be passed by the wireline carriers to the PSAPs.

IV. Conclusion

Technical developments and service delivery have changed to afford PSAPs with greater caller location certainty and dependability when the uncertainty factor is delivered. Some wireless carriers do not calculate or deliver the uncertainty factor. The Wireless Board does not presently argue that all wireless carriers must calculate and deliver the uncertainty factor to PSAPs. However, when wireless carriers do calculate and deliver the uncertainty factor, the Wireless Board argues that such information bears directly upon the purpose of E911, is an integral part of ALI, and must be passed by the wireline carriers to the PSAPs. The current accuracy and reliability standards should be interpreted to require wireless and wireline carriers to deliver the uncertainty factor as part of the ALI for Phase II when the wireless carriers determine such information.

Respectfully submitted,

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